7. (Amended) A method of producing a non-aqueous electrolyte battery, including a positive electrode containing a lithium composite oxide; a negative electrode containing a negative electrode material composed of a mixture of a non-carbon material in or from which lithium is doped or released and a carbon material, said negative electrode being disposed opposite to the positive electrode; and a non-aqueous electrolytic solution used as a non-aqueous electrolyte interposed between the positive electrode and the negative electrode, said method comprising the step of:

pouring the non-aqueous electrolytic solution in the non-aqueous electrolyte battery in an inert gas atmosphere or a dry air atmosphere,

wherein a ratio of an average particle size R_M of the non-carbon material in the negative electrode material to an average particle size R_C of the carbon material in the negative electrode material is in a range of $R_M/R_C \leq 1$.

REMARKS

Claims 1-7 are pending in the application. In the Office Action of July 3, 2002, the Examiner made the following disposition:

A.) Rejected claim 4 under 35 U.S.C. §102(b) as being anticipated by *Matsufuji et al.*

B.) Rejected claims 1 and 5 under 35 U.S.C. §103(a) as being unpatentable over *Matsufuji et al.* in view of *Kato et al.*, in view of *Beauchamp*.

C.) Rejected claims 6 and 7 under 35 U.S.C. §103(a) as being unpatentable over *Yasunami* in view of *Watanabe et al.*

D.) Rejected claims 2 and 3 under 35 U.S.C. §103(a) as being unpatentable over *Taniuchi et al.* in view of *Watanabe et al.*

Applicants respectfully traverse the rejections and address the Examiner's disposition as follows:

Applicants' claims 1, 2, 3, 4, 6, and 7 have each been amended to claim that a ratio of an average particle size R_M of the non-carbon material in the negative electrode material to an average particle size R_C of the carbon material in the negative electrode material is in a range of $R_M/R_C \leq 1$. Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned **"VERSION WITH MARKING TO SHOW CHANGES MADE**.

A.) Rejection of claim 4 under 35 U.S.C. §102(b) as being anticipated by *Matsufuji et al.*:

Applicants respectfully disagree with the rejection.

Applicants' independent claim 4, as amended, claims a method of producing a negative electrode using a negative electrode black mix containing a negative electrode material composed of a mixture of a non-carbon material and a carbon material. The method comprises the step of hot-pressing the negative electrode black mix, wherein a ratio of an average particle size R_M of the non-carbon material in the negative electrode material to an average particle size R_C of the carbon material in the negative electrode material is in a range of $R_M/R_C \leq 1$.

Thus, the average size of the non-carbon material in the negative electrode material is equal to or smaller than the average particle size of the carbon material in the negative electrode material. As a result, particles of the non-carbon material permeate gaps formed by particles of the carbon material having larger particle sizes.

In the negative electrode containing the non-carbon material and the carbon material, the gaps formed by particles of the carbon material having larger particle sizes are used as fields where, for example, lithium is doped or released in or from the non-carbon material. Since lithium is doped or released in or from the non-carbon material in the gaps formed by the particles of the carbon material, if there occurs a change in volume of the non-carbon material due to expansion or contraction of the non-carbon material when lithium is doped or released in or from the non-carbon material, then the change in volume of the non-carbon material can be absorbed by the gaps formed by the particles of the carbon material. As a result, it is possible to suppress a change in volume of the entire negative electrode material, and hence to significantly improve cycle characteristics. (Specification, page 12, line 22 - page 14, line 16).

This is clearly unlike *Matsufuji et al.*, which fails to disclose a negative electrode material having average size of a non-carbon material that is equal to or smaller than an average particle size of a carbon material in the negative electrode material. Nowhere does *Matsufuji et al.* even discuss a ratio of the average size of its various negative electrode materials. In an example, *Matsufuji et al.* describes making a negative electrode active material, wherein 200g of $SnGe_{0.1}B_{0.5}P_{0.58}Mg_{0.1}K_{0.1}O_{3.35}$ having an average particle diameter of 4.5μm is mixed with 30g of artificial graphite. (Col. 17, lines 27-48). In the example, however, *Matsufuji et al.* fails to teach an average particle size of its artificial graphite. Accordingly, *Matsufuji et al.* fails to disclose or even suggest that its $SnGe_{0.1}B_{0.5}P_{0.58}Mg_{0.1}K_{0.1}O_{3.35}$ has average size that is equal to or smaller than an average particle size of its artificial graphite. Therefore, *Matsufuji et al.* could not disclose or even suggest Applicants' claim 4.

Applicants respectfully submit that the rejection has been overcome and request that it be withdrawn.

B.) Rejection of claims 1 and 5 under 35 U.S.C. §103(a) as being unpatentable over *Matsufuji et al.* in view of *Kato et al.*, in view of *Beauchamp*:

Applicants respectfully disagree with the rejection.

Similar to Applicants' claim 4, Applicants' independent claim 1 claims that a ratio of an average particle size R_M of a non-carbon material in a negative electrode material to an average particle size R_C of a carbon material in the negative electrode material is in a range of $R_M/R_C \leq 1$. Therefore, for at least the reasons discussed above with respect to claim 4, claim 1 is also allowable over *Matsufuji et al.* In other words, since *Matsufuji et al.* fails to disclose or suggest that a ratio of an average particle size R_M of a non-carbon material in a negative electrode material to an average particle size R_C of a carbon material in the negative electrode material is in a range of $R_M/R_C \leq 1$, *Matsufuji et al.* fails to disclose or suggest Applicants' claim 1.

Kato et al. and *Beauchamp* also fail to disclose Applicants' claimed ratio. *Kato et al.* discloses several examples wherein a green coke is pulverized to an average particle size, however, nowhere does *Kato et al.* disclose or suggest that that a ratio of an average particle size R_M of a non-carbon material to an average particle size R_C of a carbon material in a negative electrode material is in a range of $R_M/R_C \leq 1$. *Kato et al.* teaches a particulate carbonaceous material having various average particle sizes, namely of 10μm to 135μm, however, nowhere does *Kato et al.* disclose or suggest a ratio of particle sizes for a non-carbon material and a carbon material. Therefore, *Matsufuji et al.* in view of *Kato et al.* fails to disclose or suggest Applicants' claim 1.

Unlike Applicants' claim 1, *Beauchamp* fails to even discuss particle sizes. Thus, *Matsufuji et al.* in view of *Kato et al.*, and further in view of *Beauchamp*, fails to disclose or suggest Applicants' claim 1.

Claim 4 is allowable over *Matsufuji et al.* as discussed above. Since *Kato et al.* and *Beauchamp* also fail to disclose or suggest Applicants' claimed particle sizes, claim 4 is allowable over *Matsufuji et al.* in view of *Kato et al.* and further in view of *Beauchamp*. Claim 5 depends directly from claim 4 and is therefore allowable for at least the same reasons that claim 4 is allowable.

Applicants respectfully submit that the rejection has been overcome and request that it be withdrawn.

C.) Rejection of claims 6 and 7 under 35 U.S.C. §103(a) as being unpatentable over *Yasunami* in view of *Watanabe et al.*:

Applicants respectfully disagree with the rejection.

Similar to Applicants' claim 4, Applicants' independent claims 6 and 7 each claim that a ratio of an average particle size R_M of a non-carbon material in a negative electrode material to an average particle size R_C of a carbon material in the negative electrode material is in a range of $R_M/R_C \leq 1$.

This is clearly unlike either *Yasunami* and *Watanabe et al.*, taken singly or in combination, neither of which discloses or suggests Applicants' claimed ratio. *Yasunami* discloses an example of a negative electrode material comprising $SnB_{0.2}P_{0.5}K_{0.1}Mg_{0.1}Ge_{0.1}O_{2.8}$ (average particle diameter 7.5μm), acetylene black (no particle size disclosed or suggested), and graphite (no particle size disclosed or suggested). (Col. 19, lines 25-30). Thus, *Yasunami* discloses a non-carbon material particle size but fails to disclose or suggest its size ratio to a carbon material particle size. In another example, *Yasunami* discloses the same materials as the above-described *Yasunami* example, but teaches that the $SnB_{0.2}P_{0.5}K_{0.1}Mg_{0.1}Ge_{0.1}O_{2.8}$ has an average particle diameter of 6.8μm. Again, in this example, *Yasunami* fails to disclose or suggest a particle size for its carbon material. Accordingly, *Yasunami* fails to disclose or suggest a ratio of the size of its non-carbon material to the size of its carbon material in its negative electrode material. So, unlike Applicants' claims 6 and 7, *Yasunami* fails to disclose or suggest that a ratio of an average particle size R_M of a non-carbon material in a negative electrode material to an average particle size R_C of a carbon material in the negative electrode material is in a range of $R_M/R_C \leq 1$.

Therefore, *Yasunami* fails to disclose or suggest Applicants' claims 6 and 7.

Further, *Watanabe et al.* also fails to disclose or suggest Applicants' claimed ratio. *Watanabe et al.* teaches a negative electrode non-carbon material having a particle size preferably 500 μm or less. (Col. 7, lines 41-46). Further, in an example, *Watanabe et al.* discloses a non-carbon material (SiO) having a particle size of 44μm or less mixed with a carbon material (no particle size disclosed or suggested). Thus, while *Watanabe et al.* discloses a particle size for its non-carbon material, *Watanabe et al.* also fails to disclose or suggest a particle size for its carbon material. Therefore, unlike Applicants' claims 6 and 7, *Watanabe et al.* fails to disclose or suggest suggest that a ratio of an average particle size R_M of a non-carbon material in a negative electrode material to an average particle size R_C of a carbon material in the negative electrode material is in a range of $R_M/R_C \leq 1$.

Accordingly, *Yasunami* in view of *Watanabe et al.* still fails to disclose or suggest Applicants' claims 6 and 7.

Applicants respectfully submit that the rejection has been overcome and request that it be withdrawn.

D.) Rejection of claims 2 and 3 under 35 U.S.C. §103(a) as being unpatentable over *Taniuchi et al.* in view of *Watanabe et al.*:

Applicants respectfully disagree with the rejection.

Similar to Applicants' claims 6 and 7, Applicants' independent claims 2 and 3 each claim that a ratio of an average particle size R_M of a non-carbon material in a negative electrode material to an average particle size R_C of a carbon material in the negative electrode material is in a range of $R_M/R_C \leq 1$. Thus, similar to claims 6 and 7, claims 2 and 3 are allowable over *Watanabe et al.*, because *Watanabe et al.* fails to disclose or suggest Applicants' claimed ratio.

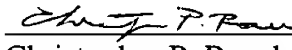
Taniuchi et al. also fails to disclose or suggest Applicants' claimed ratio, therefore *Taniuchi et al.* in view of *Watanabe et al.* fails to disclose or suggest Applicants' claims 2 and 3. Unlike Applicants' claims 2 and 3, *Taniuchi et al.* fails to even discuss particle size. Therefore, *Taniuchi et al.* in view of *Watanabe et al.* still fails to disclose or suggest that a ratio of an average particle size R_M of a non-carbon material in a negative electrode material to an average particle size R_C of a carbon material in the negative electrode material is in a range of $R_M/R_C \leq 1$. Accordingly, *Taniuchi et al.* in view of *Watanabe et al.* fails to disclose or suggest Applicants' claims 2 and 3.

Applicants respectfully submit that the rejection has been overcome and request that it be withdrawn.

CONCLUSION

In view of the foregoing, it is submitted that claims 1-7 are patentable. It is therefore submitted that the application is in condition for allowance. Notice to that effect is respectfully requested.

Respectfully submitted,

 (Reg. No. 45,034)

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Please amend claims 1, 2, 3, 4, 6, and 7 as follows:

1. (Amended) A method of producing a negative electrode material composed of a mixture of a non-carbon material and a carbon material, comprising the step of:

pulverizing and classifying each of the non-carbon material and the carbon material in an inert gas atmosphere,

wherein a ratio of an average particle size R_M of the non-carbon material in the negative electrode material to an average particle size R_C of the carbon material in the negative electrode material is in a range of $R_M/R_C \leq 1$.

2. (Amended) A method of producing a negative electrode material composed of a mixture of a non-carbon material and a carbon material, comprising the step of:

mixing the non-carbon material and the carbon material in an inert gas atmosphere,

wherein a ratio of an average particle size R_M of the non-carbon material in the negative electrode material to an average particle size R_C of the carbon material in the negative electrode material is in a range of $R_M/R_C \leq 1$.

3. (Amended) A method of producing a negative electrode by applying a negative electrode black mix containing a negative electrode material composed of a mixture of a non-carbon material and a carbon material on a negative electrode collector and drying the negative electrode black mix, comprising the step of:

applying the negative electrode black mix on the negative electrode collector and drying the negative electrode black mix in an inert gas atmosphere or a dry air atmosphere,

wherein a ratio of an average particle size R_M of the non-carbon material in the negative electrode material to an average particle size R_C of the carbon material in the negative electrode material is in a range of $R_M/R_C \leq 1$.

4. (Amended) A method of producing a negative electrode using a negative electrode black mix containing a negative electrode material composed of a mixture of a non-carbon material and a carbon material, comprising the step of:

hot-pressing the negative electrode black mix,

wherein a ratio of an average particle size R_M of the non-carbon material in the negative electrode material to an average particle size R_C of the carbon material in the negative electrode material is in a range of $R_M/R_C \leq 1$.

6. (Amended) A method of producing a non-aqueous electrolyte battery, including a positive electrode containing a lithium composite oxide; a negative electrode containing a negative electrode material composed of a mixture of a non-carbon material in or from which lithium is doped or released and a carbon material, said negative electrode being disposed opposite to the positive electrode; and a non-aqueous electrolyte interposed between the positive electrode and the negative electrode, said method comprising the step of:

winding the negative electrode into a wound body in an inert gas atmosphere or a dry air atmosphere,

wherein a ratio of an average particle size R_M of the non-carbon material in the negative electrode material to an average particle size R_C of the carbon material in the negative electrode material is in a range of $R_M/R_C \leq 1$.

7. (Amended) A method of producing a non-aqueous electrolyte battery, including a positive electrode containing a lithium composite oxide; a negative electrode containing a negative electrode material composed of a mixture of a non-carbon material in or from which lithium is doped or released and a carbon material, said negative electrode being disposed opposite to the positive electrode; and a non-aqueous electrolytic solution used as a non-aqueous electrolyte interposed between the positive electrode and the negative electrode, said method comprising the step of:

pouring the non-aqueous electrolytic solution in the non-aqueous electrolyte battery in an inert gas atmosphere or a dry air atmosphere,

wherein a ratio of an average particle size R_M of the non-carbon material in the negative electrode material to an average particle size R_C of the carbon material in the negative electrode material is in a range of $R_M/R_C \leq 1$.

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited as First Class Mail in an envelope addressed to Asst. Commissioner for Patents, Washington, D.C. 20231 on August 16, 2002.

(Reg. No. 45,034)
Christopher P. Rauch